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Extraction of reliable information from hme-domain pressure and flow signals measured by means of forced oscillation techniques

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Abstract

This paper aims to give a proof-of-concept for the possible application of the forced oscillation lung function test to assess the viscoelastic properties of the airways and tissue. In particular, a novel signal processing algorithm is employed on non-stationary, noisy, (relatively) short time series of respiratory pressure and flow signals. This novel technique is employed to filter the useful information from the signals acquired under two measurement conditions: pseudo-functional residual capacity (PFRC) and pseudo-total lung capacity (PTLC). The PFRC is the measurement performed at lowest lung volume with maximum deflation, and the PTLC is measurement performed at the maximum lung volume under maximum inflation. The results suggest that the proposed technique is able to extract information on the viscoelastic properties of the lung tissue at a macroscopic level. The conclusion of this preliminary study is that the proposed combination of signal processing method and lung function test is suited to be employed on a large database in order to deliver reference values and perform further statistical analysis.

Keywords

Detrending procedure, Filtering, Lung function, Oscillatory mechanics, Respiratory mechanics, Statistical signal processing